



Screening Cranberries for Trace EDB Contamination

by Julianne Nassif

A technical working group comprised of representatives of state and federal health and environmental agencies, the U.S. Air Force, and the Massachusetts cranberry industry is developing a consensus document for the testing of cranberries for ethylene dibromide (EDB). The interpretation and comparison of data on trace contaminants in food are often difficult because laboratories use different methods and instruments. Inter-laboratory variability can be large for these types of analyses, which rely heavily on the efficiency of complex extraction procedures that must be done before analytical measurement of the compound of interest. The State Laboratory Institute (SLI) and the Bureau of Environmental Health Assessment (BEHA) represent the Massachusetts Department of Public Health (MDPH) on this working group.

SLI tests a variety of produce and grain products for EDB, which was formerly used as a fumigant. EDB, a potent carcinogen, is no longer approved for use as a crop fumigant, but it is still used as a jet fuel additive. Analysis of foods for EDB is done at SLI by sweep co-distillation with hexane to extract the compound from the food matrix, followed by capillary gas chromatography with electron capture detection. Recovery of EDB from the matrix is typically from 80-110%. Strict quality control is maintained by analyzing laboratory fortified matrix samples, matrix blanks and reagent blanks concurrently with test samples. All products that are found with EDB contamination are re-analyzed by CGC-ECD using a chromatographic column with a liquid phase dissimilar from the column used in the initial test. Sixty-meter DB-5 (5% phenyl methyl polysiloxane) and DB-1701 (14% cyanopropyl-phenyl methyl polysiloxane) columns are used in these analyses for detection and confirmation of EDB.

Ground and surface waters in parts of Falmouth and Mashpee on Cape Cod are known to be contaminated with EDB leaching from hazardous waste sites on the Massachusetts Military Reservation. Because this water was used to irrigate the cranberry bogs, MDPH became concerned about possible EDB contamination in cranberries. In 1996, SLI tested cranberries harvested from several bogs in the towns of Falmouth and Mashpee on Cape Cod, all of which were negative for EDB.

However in 1997, SLI detected trace amounts of EDB in cranberries harvested from multiple bogs located in the Quashnet and Coonamessett River systems. This resulted in voluntary destruction of the crop by the cranberry growers, who were later reimbursed for losses by the US Department of Defense. Additional samples, taken at a different point in time and analyzed by a less sensitive method at a private contract laboratory for the U.S.A.F., did not detect EDB residues. State agencies and U.S.A.F. recognized the value of prospective agreement on sampling protocols and test methods to permit comparison of test results from different laboratories, and formed the working group to develop these standards.

The analytical protocol is performance based, permitting different preparatory and instrumental techniques provided that specified detection and reporting limits and quality control criteria are achieved and maintained. Specifically, laboratories must achieve a detection and reporting limit of 0.04 parts per billion for EDB in cranberries. They may do this by sweep co-distillation, purge and trap or another extraction procedure followed by GC/ECD or gas chromatography/mass spectrometry selective ion monitoring (GC/MS-SIM). Rigorous quality control must be maintained by including surrogates, laboratory fortified matrix samples, matrix blanks and reagent blanks in each analytical run. Positive samples with concentrations less than 1.0 ppb must be confirmed by GC/MS-SIM.

A draft protocol was pilot tested in 1998 and is currently under final revision. It will be released prior to the fall harvest.

Milk Laboratory Certification Program

by Harvey George

The Massachusetts Milk Laboratory Certification Program, a state and federally mandated regulatory program, is designed to safeguard the public milk supply. The Program accomplishes this by ensuring that the testing of milk and milk products is carried out by competent analysts, that the procedures used are approved, and that the equipment and laboratories are adequate. The State Laboratory Institute (SLI) of the Department of Public Health (DPH) has the regulatory responsibility for the approval of commercial and municipal laboratories performing mandated testing of milk, milk products and frozen (milk containing) desserts and for the certification of their analysts.

Historically, the U.S. Food and Drug Administration (FDA), the Laboratory Quality Assurance Branch of the Center for Food Safety, has delegated the responsibility for the regulation of Massachusetts laboratories performing testing of milk, milk products and frozen (milk containing) desserts to SLI. Although this responsibility applies only to milk being sold in interstate commerce, the DPH has deemed that similar

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regulations and responsibilities apply to all Massachusetts milk producers.

In order to carry out the Certification Program, bacteriologists at SLI are trained by the FDA as Milk Laboratory Evaluation Officers (LEO). Their responsibilities include performing an annual on-site inspection of every laboratory (the alternate years'

inspection is unannounced) and observing each analyst performing every test for which they seek certification. The LEO prepares a written report of his/her findings. If deficiencies are found, the laboratory has 60 days to prepare a written response documenting how they have corrected or will correct the deficiencies. The LEOs also prepare quarterly proficiency testing samples that must be analyzed by every analyst to assess his/her competency. Laboratories and personnel that pass both the on-site inspection and the proficiency samples are issued certificates enabling them to perform

regulatory milk testing. Each certificate is valid for a period of one year.

The Laboratory Evaluation Officers are also responsible for operation of the FDA certified Massachusetts Reference Milk Testing Laboratory at SLI. Every 3 years, each LEO must attend a 1-week FDA refresher class, and undergo an on-site inspection of their laboratory facilities, including a review of their analytical techniques. They must also pass proficiency testing on samples sent to them annually by the FDA.

Program Reports — Pulsed-field Gel Electrophoresis (PFGE) Laboratory

by Harvey George

The priority for use of PFGE at SLI is currently food borne disease outbreaks. SLI is linked to the national food safety surveillance system known as PulseNet, which can detect multi-state outbreaks by comparing PFGE patterns among outbreak associated isolates from other state and federal laboratories. PulseNet links the state public health laboratories with CDC, FDA, and USDA. In addition, SLI uses PFGE analysis for investigation of pertussis outbreaks or unusual disease outbreaks.

During the past year, PFGE aided the identification of numerous food borne disease outbreaks attributed to *Salmonella enteritidis*, *S. typhimurium*, *S. muenchen*, *Listeria monocytogenes* and *Escherichia coli*. The laboratory also performed PFGE on approximately 200 strains of *E. coli* O157:H7, 1,500 strains of *S. typhimurium* and 130 strains of *Bordetella pertussis* for surveillance purposes. CDC grants support surveillance of *E. coli* O157:H7, *Neisseria meningitidis* and *B. pertussis*.

PulseNet is a national laboratory surveillance program that provides for the rapid communication of standardized PFGE results

for *Escherichia coli* O157:H7 isolates. Genomic patterns from these analyses are transmitted electronically via the Internet to a secure database maintained at the Centers for Disease Control and Prevention (CDC). Public laboratories in the PulseNet system can query the central database repository for comparison of PFGE patterns from local isolates.

This early warning system identifies infections that may have a common link and guides epidemiological investigations quickly to a common source of an outbreak. In fact, the system often identifies an outbreak source, such as a mass produced food product like hot dogs or hamburger, soon enough to permit a recall of the contaminated product. Thus, many cases of human illness can be prevented.

Currently, the CDC database contains patterns only for *E. coli* O157:H7. The large number of PFGE genomic strain patterns in the database is increasing rapidly, and data for additional pathogens such as *Salmonella typhimurium*, *Listeria monocytogenes* and other enteric and respiratory pathogens will soon be added.

The PFGE Laboratory also receives support from CDC grants for cooperative responsibilities, such as training of public health employees in PFGE analysis and performing PFGE for other states. This year SLI served as host for the annual National PulseNet Meeting, which had representation from over 35 state public health laboratories, as well as the CDC, FDA and USDA. Staff presented three papers in poster sessions at the 99th Annual meeting of the American Society for Microbiology in Chicago: Rapid Pulsed-field Gel Electrophoresis Facilitating the Identification of Two Simultaneous, Multi-state *E. coli* O157:H7 Outbreaks; Characterization of *Bordetella holmesii* Recovered from Respiratory Specimens of Patients with Pertussis-Like Symptoms; and Pulsed-field Gel Electrophoresis Helps Demonstrate Linkage Between Food Handlers and Patrons in a *Shigella sonnei* Outbreak in Massachusetts. An article, "*Bordetella holmesii*-Like Organisms Isolated from Massachusetts Patients with Pertussis-Like Symptoms," was published in *Emerging Infectious Diseases*, 5, 441 (1999).

Program Reports — Trends in Drug Abuse

by Allan Stevenson

The State Laboratory Institute's Drug Analysis Laboratories in Jamaica Plain and Amherst provide drug identification services for municipal police departments throughout Massachusetts. The records compiled by the laboratory over the years can be

used to identify trends in drug abuse. Over the last five years the laboratory has performed analyses on over 170,000 drug samples, and by looking at the drug analysis statistics for these years, we see how drug use patterns change. By far the most

common drugs encountered are cocaine, heroin and marijuana. Table 1. shows a summary of specimens received for testing by the drug laboratory in the last five fiscal years.

Table 1. Summary specimens received by SLI Drug Analysis Laboratories

	FY1995	FY1996	FY1997	FY1998	FY1999
HEROIN	4,226	4,375	4,249	4,725	4,110
COCAINE	10,562	10,052	10,225	8,630	8,369
Crack Cocaine*	(5,459)	(5,432)	(4,724)	(3,453)	(2,718)
MARIJUANA	13,547	14,464	15,519	16,058	15,412
LSA	116	103	85	77	113
AMPHETAMINES	17	5	15	33	11
BARBITURATES	18	8	15	13	7
BENZODIAZEPINES	457	386	453	456	470
OPIATES**	164	176	199	181	228
MDMA	5	6	9	27	189
PSILOCYN/ PSILOCYBIN	62	65	82	86	83
PCP	47	52	14	7	15
KETAMINE	1	6	25	35	44
OTHER CONTROLLED SUBSTANCES	1,047	1,037	1,177	1,521	1,501
NEGATIVES	2,216	2,148	2,025	1,730	1,792
NOT TESTED	782	957	1,336	1,772	1,534
TOTAL	33,267	33,840	35,428	35,351	33,878

*Crack cocaine sample totals are included in the cocaine totals

**Opiates other than heroin

Heroin submissions increased from FY95 to FY98, and then dropped off in FY99. Cocaine submissions (including crack cocaine) have been steadily declining since 1994, after having seen dramatic growth in the 1980s and early 1990s. Marijuana samples have increased by 14% since FY95. MDMA (ecstasy), a hallucinogenic drug derived from methamphetamine, continues to become more prevalent. Submissions ranged from 5 to 27 from FY95-98, then showed a dramatic increase to 189 in FY99. Most frequently seen as tablets with

various logos pressed into the surface, it is sometimes found in gel capsules or in powder form. Hallucinogenic mushrooms containing psilocyn or psilocybin have averaged about 76 samples per year over the last five years. LSD samples have averaged about 99 samples per year. PCP (angel dust) has seen some decline in popularity, while use of ketamine (Special K) has been on the increase. These drugs are chemically related, and both have been used as animal anesthetics.

Illicit use of regular prescription drugs is on

the rise; there was a 43% increase in prescription drug submissions to the lab over the last five years. These drugs include anabolic steroids (used by some athletes and body builders), benzodiazepines (diazepam and related compounds), analgesics and a variety of other substances.

Additional information about drug abuse trends in Massachusetts can be obtained in publications prepared for the Department of Public Health by Health and Addictions Research, Inc., 419 Boylston Street, Suite 801, Boston, MA 02116.

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for the electronic version of this newsletter and other information about the State Laboratory Institute: www.state.ma.us/dph/bls.

Laboratory Training Activities

Response to Bioterrorism - Role of the Clinical Laboratory, Baystate Medical Center, Springfield, MA, Nov 1, 1-day with speakers from the FBI, Medical and Public Health Communities. Call (617) 983-6285.

SLI Co-sponsored Programs at the Region I ASM Annual Meeting, Worcester Centrum, Worcester, MA: Anaerobic Bacteriology - Oct. 26; OSHA & Safety - Oct. 26; Bioterrorism - Oct. 29. Call (617) 983-6371

Public Health Teleconference Series, State Laboratory Institute, Boston, MA: Influenza - October 19, *Chlamydia trachomatis* - November 16. Fee \$25 per site per program. Call (617) 983-6285.

State Laboratory Training Coordinator, *Garry R. Greer, BS, (617) 983-6608, E-mail: garry.greer@state.ma.us.*

For a list of NLTN courses in your area sign on to the Web at <http://www.cdc.gov/phppo/dls/nltn.htm>.

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